

WHAT IS CLAIMED IS:

1. A fingerprint identification system for conducting identification of fingerprints using fingerprint images, comprising:

5 a fingerprint identification device for conducting fingerprint identification based on first feature vector data obtained by extracting features of a fingerprint from a fingerprint image; and

10 a fingerprint identification terminal for transmitting a fingerprint image or the first feature vector data of the fingerprint image to said fingerprint identification device remotely disposed and receiving an identification result from said fingerprint identification device, wherein

15 said fingerprint identification terminal receives input of a plurality of fingerprint images for one finger, calculates image quality of said fingerprint image to rearrange said plurality of fingerprint images based on the image quality, and transmits the first feature vector data of said fingerprint images rearranged to the fingerprint identification device, and

20 said fingerprint identification device receives input of the first feature vector data of the plurality of fingerprint images for one finger and collates the first feature vector data of said plurality of fingerprint images with second feature vector data of a

25

plurality of fingerprint images stored in a fingerprint data base to conduct fingerprint identification determination based on a plurality of identification scores corresponding to the respective second feature vector data which are obtained from the matching result.

2. The fingerprint identification system as set forth in claim 1, wherein

said fingerprint identification terminal includes a scanner interface unit having a function of receiving input of a plurality of fingerprint images per finger from an external fingerprint scanner device, a main memory for holding said plurality of fingerprint images, and a main control unit for calculating image quality of each of the plurality of fingerprint images held in said main memory, ranking the plurality of fingerprint images in said main memory in descending order of quality and selecting a preset number of high-quality images to calculate first feature vector data of a fingerprint from the selected fingerprint image.

3. The fingerprint identification system as set forth in claim 2, wherein

said fingerprint identification terminal includes a communication input/output control unit having a function of sending said selected fingerprint image or the first feature vector data of the image to said

fingerprint identification device and a function of receiving identification result data returned from said fingerprint identification device.

10

4. The fingerprint identification system as set forth in claim 2, wherein

said fingerprint identification terminal includes:

5

a console display unit capable of displaying any of confirmation indication, processing state indication and fingerprint identification processing result indication of the plurality of fingerprint images stored in said main memory or an arbitrary combination of these indications, and

10

an input unit for receiving input for changing a display method of said console display unit and changing condition data for use in fingerprint identification which is set in advance in the processing of said main control unit.

15

5. The fingerprint identification system as set forth in claim 1, wherein

said fingerprint identification device receives

input of feature vector data of each of the

5

plurality of fingerprint images for one finger, and following a procedure predetermined according to the order of fingerprint image quality corresponding to each

10 said fingerprint image, selects execution of either one-
to-N matching or one-to-one matching between said first
feature vector data and said second feature vector data,
executes the selected matching processing, selects first
feature vector data of a fingerprint image to be
targeted next based on the determination whether each
matching result satisfies preset conditions or not and
15 repeats either one-to-N or one-to-one matching of the
first feature vector data with said second feature
vector data to output an identification result of the
plurality of fingerprint images.

6. The fingerprint identification system as set
forth in claim 1, wherein

said fingerprint identification terminal includes
a scanner interface unit having a function of
5 receiving input of a plurality of fingerprint images per
finger from an external fingerprint scanner device, a
main memory for holding said plurality of fingerprint
images, and a main control unit for calculating image
quality of each of the plurality of fingerprint images
10 held in said main memory, ranking the plurality of
fingerprint images in said main memory in descending
order of quality and selecting a preset number of high-
quality images to calculate first feature vector data of
a fingerprint from the selected fingerprint image, and
15 said fingerprint identification device receives

input of feature vector data of each of the plurality of fingerprint images for one finger, and following a procedure predetermined according to the order of fingerprint image quality corresponding to each said fingerprint image, selects execution of either one-to-N matching or one-to-one matching between said first feature vector data and said second feature vector data, executes the selected matching processing, selects first feature vector data of a fingerprint image to be targeted next based on the determination whether each matching result satisfies preset conditions or not and repeats either one-to-N or one-to-one matching of the first feature vector data with said second feature vector data to output an identification result of the plurality of fingerprint images.

7. The fingerprint identification system as set forth in claim 1, wherein

said fingerprint identification device receives input of the first feature vector data of each of the plurality of fingerprint images for one finger and conducts one-to-N matching of all of the first feature vector data with the second feature vector data to select only the identification scores that satisfy preset conditions starting with a score having the largest value,

conducts fusion operation of the selected

identification score with identification scores
corresponding to a plurality of feature vector data of
the same finger to calculate a fusion score, and

15 outputs an identification result based whether
the fusion score satisfies preset identification
conditions.

8. The fingerprint identification system as set
forth in claim 1, wherein

 said fingerprint identification device receives
 input of each feature vector data of a plurality
5 of fingerprint image data for each of a plurality of
fingers to output an identification result with a
representative score calculated from said feature vector
data of the plurality of fingerprint images of each
finger in combination with a result of whether the
10 representative score of each finger satisfies preset
conditions.

9. The fingerprint identification system as set
forth in claim 1, wherein

 said fingerprint identification device receives
 input of each feature vector data of a plurality
5 of fingerprint image data for each of a plurality of
fingers to obtain a representative score calculated from
said feature vector data of the plurality of fingerprint
images of each finger, and calculates a fusion score

based on the representative score of each finger to
10 output a result of whether the fusion score satisfies
preset identification conditions as an identification
result.

10. A fingerprint identification method of conducting
identification of fingerprints based on fingerprint
images, comprising the steps of:

5 at said fingerprint identification terminal,
receiving input of a plurality of fingerprint
images for one finger,

calculating image quality of said fingerprint
image to rearrange said fingerprint images based on the
image quality, and

10 extracting first feature vector data of said
fingerprint images rearranged to transmit the data to
the fingerprint identification device, and

at said fingerprint identification device,
receiving input of the first feature vector data
15 of the plurality of fingerprint images for one finger,

collating the first feature vector data of said
plurality of fingerprint images with second feature
vector data of a plurality of fingerprint images stored
in a fingerprint data base, and

20 conducting fingerprint identification
determination based on a plurality of identification
scores corresponding to the respective second feature

vector data which are obtained from the matching result.

11. The fingerprint identification method as set forth in claim 10, wherein

said fingerprint identification terminal receives and displays identification result data of said fingerprint images obtained by said fingerprint identification device.

12. The fingerprint identification method as set forth in claim 10, wherein

said fingerprint identification terminal, receives input of a plurality of fingerprint images per finger from an external fingerprint scanner device by a scanner interface unit, holds said plurality of fingerprint images in a main memory,

calculates image quality of each of the plurality of fingerprint images held in said main memory,

ranks the plurality of fingerprint images in said main memory according to said quality in descending order of quality to select a preset number of high-quality images,

calculates first feature vector data of a fingerprint from said selected fingerprint image and sends said selected fingerprint image or the first feature vector data of the image to said fingerprint

identification device, and

20 receives identification result data returned from
said fingerprint identification device.

13. The fingerprint identification method as set
forth in claim 10, wherein

 said fingerprint identification device

 receives input of feature vector data of each of
5 the plurality of fingerprint images for one finger, and
following a procedure predetermined according to the
order of fingerprint image quality corresponding to each
said fingerprint image,

 selects execution of either one-to-N matching or
10 one-to-one matching between said first feature vector
data and said second feature vector data,

 executes the selected matching processing to
select first feature vector data of a fingerprint image
to be targeted next based on the determination whether
15 each matching result satisfies preset conditions or not,
and

 repeats either one-to-N or one-to-one matching of
the first feature vector data with said second feature
vector data to output an identification result of the
20 plurality of fingerprint images.

14. The fingerprint identification method as set
forth in claim 10, wherein

said fingerprint identification device

receives input of the first feature vector data
5 of each of the plurality of fingerprint images for one
finger and conducts one-to-N matching of all of the
first feature vector data with the second feature vector
data to select only the identification scores that
satisfy preset conditions starting with a score having
10 the largest value,

conducts fusion operation of the selected
identification score with identification scores
corresponding to a plurality of feature vector data of
the same finger to calculate a fusion score, and

15 outputs an identification result based whether
the fusion score satisfies preset identification
conditions.

15. The fingerprint identification method as set
forth in claim 10, wherein

said fingerprint identification device receives
input of each feature vector data of a plurality
5 of fingerprint image data for each of a plurality of
fingers to output an identification result with a
representative score calculated from said feature vector
data of the plurality of fingerprint images of each
finger in combination with a result of whether the
10 representative score of each finger satisfies preset
conditions.

16. The fingerprint identification method as set forth in claim 10, wherein

said fingerprint identification device receives
input of each feature vector data of a plurality
5 of fingerprint image data for each of a plurality of
fingers to obtain a representative score calculated from
said feature vector data of the plurality of fingerprint
images of each finger, and calculates a fusion score
based on the representative score of each finger to
10 output a result of whether the fusion score satisfies
preset identification conditions as an identification
result.

17. A fingerprint identification program for
conducting identification of fingerprints based on
fingerprint images by the control of a computer, which
causes

5 said fingerprint identification terminal to
execute the functions of:

receiving input of a plurality of fingerprint
images for one finger,

calculating image quality of said fingerprint
10 image to rearrange said fingerprint images based on the
image quality, and

extracting first feature vector data of said
fingerprint images rearranged to transmit the data to

the fingerprint identification device, and

15 said fingerprint identification device to execute
the functions of:

 receiving input of the first feature vector data
of the plurality of fingerprint images for one finger,

 collating the first feature vector data of said
20 plurality of fingerprint images with second feature
vector data of a plurality of fingerprint images stored
in a fingerprint data base, and

 conducting fingerprint identification
determination based on a plurality of identification
25 scores corresponding to the respective second feature
vector data which are obtained from the matching result.

18. The fingerprint identification program as set
forth in claim 17, which causes

 said fingerprint identification device to execute
the functions of:

5 receiving input of feature vector data of each of
the plurality of fingerprint images for one finger, and
following a procedure predetermined according to the
order of fingerprint image quality corresponding to each
said fingerprint image,

10 selecting execution of either one-to-N matching
or one-to-one matching between said first feature vector
data and said second feature vector data,

 executing the selected matching processing to

15 select first feature vector data of a fingerprint image
to be targeted next based on the determination whether
each matching result satisfies preset conditions or not,
and

repeating either one-to-N or one-to-one matching
of the first feature vector data with said second
20 feature vector data to output an identification result
of the plurality of fingerprint images.

19. The fingerprint identification program as set
forth in claim 17, which causes

said fingerprint identification device to execute
the functions of:

5 receiving input of the first feature vector data
of each of the plurality of fingerprint images for one
finger and conducting one-to-N matching of all of the
first feature vector data with the second feature vector
data to select only the identification scores that
10 satisfy preset conditions starting with a score having
the largest value,

conducting fusion operation of the selected
identification score with identification scores
corresponding to a plurality of feature vector data of
15 the same finger to calculate a fusion score, and

outputting an identification result based whether
the fusion score satisfies preset identification
conditions.

20. The fingerprint identification program as set forth in claim 17, which causes

said fingerprint identification device to execute the function of

5 receiving input of each feature vector data of a plurality of fingerprint image data for each of a plurality of fingers to output an identification result with a representative score calculated from said feature vector data of the plurality of fingerprint images of
10 each finger in combination with a result of whether the representative score of each finger satisfies preset conditions.

21. The fingerprint identification program as set forth in claim 17, which causes

said fingerprint identification device to execute the function of

5 receiving input of each feature vector data of a plurality of fingerprint image data for each of a plurality of fingers to obtain a representative score calculated from said feature vector data of the plurality of fingerprint images of each finger, and
10 calculating a fusion score based on the representative score of each finger to output a result of whether the fusion score satisfies preset identification conditions as an identification result.